

## Dileep Singh

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### Professional Experience

#### *Argonne National Laboratory*

- |   |              |
|---|--------------|
| • Materials Scientist, Nuclear Engineering Division | 2003-current |
| • Ceramist, Energy Technology Division              | 1998-2001    |
| • Assistant Ceramist, Energy Technology Division    | 1994-1998    |
| • Post-doctoral fellow, Energy Technology Division  | 1991-1994    |

Over a span of about 15 years at ANL, worked as a principal investigator/investigator on numerous projects related to structural ceramics, composites, and materials development. Demonstrated continued success in securing research funding from various sources, including DOE, State Department, DARPA, TARDEC, and industry.

*Current Argonne Assignment:* use expertise in Materials Science and Engineering to conduct research on advanced materials for energy applications. Current areas of interest:

- Structure-mechanical property relationships in advanced energy materials
- Thermoelectrics
- Nanofluids for heat transfer
- Materials for waste management

#### *Agere Systems, 2001–2003*

- Member of Technical Staff, Process & Packaging Platform Group
- Managed Product Qualification, Thermal Management, and Materials Characterization laboratories

### Technical Highlights

#### *Argonne National Laboratory*

- Co-invented novel phosphate based ceramics that has found applications in radioactive and hazardous waste containment, as a structural material, and as a high-temperature binder.
- Successfully scaled-up “*Ceramicrete*” technology and subsequently transferred the technology to industry. *Technology licensed by ANL to several companies.*
- Developed plastic deformation process for joining of various materials including intermetallics, biomaterials, and ceramics. Demonstrated this technique for design and fabrication of potentiometric planar O<sub>2</sub> and dual NO<sub>x</sub>/O<sub>2</sub> sensors with an internal reference. Investigated fundamental mechanisms attributed to plastic joining. *Licensing agreement being negotiated with two companies.*
- Development & characterization of nanofluids with enhanced thermal properties. Identified and demonstrated the applicability of SiC/water nanofluids for heat transfer applications. Developed SAXS technique for evaluating particles sizes in nanofluids.

- Demonstrated applicability of polyurethane foam for clean-up activities at K-25/K-27 plants in Oak Ridge. Work resulted in EPA approval for the material usage.
- Develop high-energy x-rays based techniques for stresses in thin films, fuel cells, and biological systems.
- Studied thermo-elastic properties and generation of residual stresses for *fibrous monolithic* materials.
- Characterized fiber/matrix interfacial properties in fiber-reinforced ceramic composites and studied the role of interfacial strength on the overall mechanical response of the composites.
- Established flaw generation and failure modes in ceramic composites and correlated it to the composite macro-scale properties.
- Worked on fabrication, development, and characterization of novel ceramics & composites.

#### *Agere Systems*

- Led an effort towards a *micro* heater design & implementation for laser chip *optical sub assembly* (OSA) platform to enhance device performance. Design incorporated in manufacturing.
- Pioneered an industry wide reliability test methodology for evaluating high power laser damage in optoelectronic components.
- Resolved challenging packaging related issues including materials selection and physical design aspects for various product lines, including MEMS, fiber amplifiers.

#### **Professional Society Activities**

- *Secretary-elect*, 2008, Engineering Ceramics Division, American Ceramic Society.
- *Symposium Chair*, "Mechanical Properties of Ceramics & Composites, at 33<sup>rd</sup> International Conference on Ceramics & Composites, 2009.
- *Organizer of symposia* on "Energy Materials" and "Ceramic Coatings" at the Materials Science and Technology '07 conference.
- *Chair* of Chicago-Milwaukee Chapter of the American Ceramic Society, 1996-97.
- Member of American Ceramic Society and American Society for Metals.
- Reviewer for Journals: Am. Ceramic Society, Composite Technology, Radioactive Waste Management, Applied Physics Letters.

#### **Awards & Honors**

- 2005 R&D 100 Award, R&D Magazine for "Oxygen Sensor with Internal Reference".
- 2001 Argonne Certificate of Award for Outstanding Achievement for Development and Transfer of Ceramicrete Technology.
- Trademark for "Ceramicrete" Technology.
- Commendation Letter from Energy Secretary, Mr. Bill Richardson, May 2000.
- 2000 Federal Laboratory Consortium Award for Technology transfer to industry.
- Ceramicrete technology licensed to > 6 companies
- 1997 Pacesetter Award, ANL.
- 1996 R&D 100 Award, R&D Magazine for development of "Ceramicrete Binder".
- *Second Best Technical Presentation* from Engineering Ceramics Division of American Ceramic Society (1994).
- *Graduate Research Fellowship* from NASA, Lewis Research Center, 1987-91.

**Publications**

- 1 book chapter
- 42 journal papers
- 5 published reports
- 62 refereed proceedings papers

**Patents**

- 9 issued patents
- 6 additional patent applications filed by ANL

**National/International Committees**

- *Member, Executive Committee*, Engineering Ceramics Division, American Ceramic Society, 2008.
- *Chair of the Awards Committee*, Engineering Ceramics Division, American Ceramic Society, 2007.
- *Member of Final Waste Forms Working Group*, Department of Energy, 1995-98.
- *Member, MWIP*, Department of Energy, 1996-97.

**Student Mentoring**

- Directed thesis research of 3 M.S. students
- Mentored graduate, undergraduate, and high school students

**Educational Background**

- Ph. D., Materials Science, University of Utah (1991)
- M.S., Metallurgical Engineering, Wayne State University (1986)
- B.S., Metallurgical Engineering, Indian Institute of Technology (1983)